

Daniel Hinz - BPL Interference Levels 6-4-04

From: "Jim Spencer" <jlscr@mchsi.com>
To: "Daniel Hinz" <danielhinz@alliantenergy.com>, "Jerry Koppenhaver" <JerryKoppenhaver@alliantenergy.com>, "Tim VanWeelden" <timvanweelden@alliantenergy.com>
Date: 06/04/2004 3:04 PM
Subject: BPL Interference Levels 6-4-04
CC: "Wade Walstrom" <Walstrom@mchsi.com>, "Dave Sumner" <dsumner@arrl.org>, "Ed Hare W1RFI" <W1RFI@arrl.org>

Gentlemen,

As a follow-up to my telephone conversation with Dan this morning, I have completed a scan for BPL interference at my home. Dan told me that they had not changed the notching configuration since last Friday and that everything was the same as when I last reported on June 1. I told him that there were significant differences at my house and that it had been changed or something had failed.

Compare this data with that sent on June 1 and it clear that the interference has been moved out of all the amateur bands above 30 meters.

This afternoon between 1:20 and 2:15 PM I checked all amateur bands from 160 meters to 10 meters.

My band by band observations:

160 meters (1.8 to 2.0 MHz): No BPL observed in S9 + 20 db power-line noise.

80 meters (3.5 to 4.0 MHz): No BPL observed in S9 + 5 db power-line noise.

40 meters (7.0 to 7.3 MHz): BPL signals over the entire band, S8 to S9. Power-line noise S8.

30 meters (10.1 to 10.150 MHz): BPL signals over the entire band, S8. Power-line noise S7.

20 meters (14.0 to 14.350 MHz): No BPL signals. Power-line noise S8.

17 meters (18.068 to 18.168 MHz): No BPL signals. Power-line noise S4.

15 meters (21.0 to 21.45 MHz): No BPL signals. Power-line noise S1.

12 meters (24.89 to 24.99 MHz): No BPL signals. Power-line noise S0.

10 meters (28.0 to 29.7 MHz): No BPL signals. S0 power-line noise.

This is certainly progress. Five amateur bands are not receiving interference with this notching configuration although the interference is still extremely bad on 30 and 40 meters. However, a shortwave listener might not be so happy!

If the BPL system is working, where are the other BPL spectrums? To find the answer to that question I did two frequency scans:

1. 2 to 30 MHz using my Icom IC-765 with various antennas (actually none match the out of band well)
2. 30 to 110 MHz using a Wandel & Goltermann SPM-17

Loud BPL signals were found in two major ranges:

1. 5.6 to 6.6 MHz was full of BPL as was 8.2 to 8.7 MHz, 9.3 to 11.0 MHz and 12 to 12.2 MHz. In the noise it was hard to determine the full range of the BPL signals but they certainly were loud in those areas.
2. 30.8 to 41.0 MHz also had many loud BPL signals.

When you find out the past and current notching frequency ranges, please pass them along. I would like to correlate the notching with what I'm observing here at the station. That information should also be useful to you.

If I can help your evaluation in any other way, please let me know. As I've offered before, I would welcome any or all of you to my station to observe BPL firsthand.

Sincerely, Jim Spencer



NEBRASKA CENTER FOR EXCELLENCE IN ELECTRONICS

4740 Discovery Drive
Lincoln, NE 68521
402-472-5880

8 June 2004

Jim Cnossen
Alliant Energy
1204 11th Street SW
Cedar Rapids, IA 52404

Re: Amperion Access BPL testing

Dear Jim:

This letter is to update you on the status of the testing performed by NCEE at your test site in Cedar Rapids, IA. Preliminary results would indicate that the system as tested the week of April 12th 2004 on Glass Rd NE is in compliance with the present FCC rules for Access BPL systems. The formal report with the official results should be completed shortly.

Regards,

A handwritten signature in black ink, appearing to read "Doug Kramer". The signature is fluid and cursive, with a large loop at the beginning.

Doug Kramer
Senior Test Engineer
NCEE

Tim VanWeelden
Alliant Energy
1001 Shaver Road NE
Cedar Rapid, IA 52402

Dear Mr. VanWeelden:

BPL has been a topic of discussion for some time on the Amateur Radio bands. Hearing many negative reports on the interference it causes in the HF frequencies that the Amateur Radio operators use, I decided to do some listening on some of the Amateur Radio bands that I use.

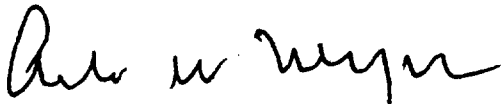
Knowing that Alliant was conducting tests using the Amperion BPL system I installed an ICOM 706 Mark IIG transceiver in my car and drove to the Glass Road Area where Alliant had the system installed. I was certainly surprised to find the amount of noise that was being generated by the system!

The interference to the 20, 15 and 10 meter bands was certainly way above the limits that are allowed by a Part 15 device of the FCC Regulations.

I would appreciate your cooperation in complying with the FCC Regulations by not installing a BPL system that does not meet the Part 15 requirements.

Please call me if I can answer any questions you may have about my findings.

Very Truly Yours,



Arlo W. Meyer WØLBK
7461 Commune Court
Cedar Rapids, IA 52411-8017

Telephone: 393-7461

Daniel Hinz - FW: BPL

From: "James Burtie" <James.Burtie@fcc.gov>
To: <timvanweelden@alliantenergy.com>
Date: 06/01/2004 1:13 PM
Subject: FW: BPL

—Original Message—

From: Arlo W Meyer [mailto:w0lbk@juno.com]
Sent: Thursday, May 27, 2004 6:09 PM
To: Anh Wride; Alan Stillwell; Riley Hollingsworth; James Burtie
Cc: ehare@arri.org
Subject: Fw: BPL

Below is a copy of a letter that I sent to Senator Grassley.

Dear Senator Grassley:

BPL has been a topic of discussion for some time on the Amateur Radio bands. Hearing many negative reports on the interference it causes in the HF frequencies that the Amateur Radio operators use, I decided to do some listening on some of the Amateur bands that I use.

Knowing that Alliant Energy was conducting tests using the Amperion BPL system I installed an ICOM Mark II G in my car and drove to the Glass Road area where the Amperion test system was installed. I was certainly surprised to find the amount of noise being generated by the system.

The interference to the 20, 15 and 10 meter bands was certainly way above the limits that are allowed by a Part 15 of the FCC Regulations.

I would appreciate your reviewing the requirements of the BPL system under test and not allowing the installation of this system in the Cedar Rapids, IA area.

Please contact me if I can answer any questions you may have of my findings.

Very truly yours,

Arlo W. Meyer WØLBK
7461 Commune Ct.
Cedar Rapids, Ia 52411-8017

Daniel Hinz - FW: Harmful Interference from BPL

From: "James Burtle" <James.Burtle@fcc.gov>
To: <timvanweelden@alliantenergy.com>
Date: 06/01/2004 1:15 PM
Subject: FW: Harmful Interference from BPL

-----Original Message-----

From: Jim Spencer [mailto:jlsr@mchsl.com]
Sent: Thursday, April 22, 2004 10:40 AM
To: Tim VanWeelden
Cc: Riley Hollingsworth; Alan Stillwell; Anh Wride; James Burtle; Ed Hare W1RFI
Subject: Harmful Interference from BPL

Tim VanWeelden
 Alliant Energy
 1001 Shaver Rd. NE
 Cedar Rapids, IA 52402

Dear Tim:

Thank you for allowing me to participate in your test of the Amperion BPL system in NE Cedar Rapids. My location, station quality and experience as an electrical engineer for over 40 years and Amateur Radio operator for over 50 years has yielded very worthwhile information about the effects of a possible BPL deployment on other services using the High Frequency bands.

Your BPL installation is causing extremely harmful interference to my station on most amateur frequency bands and it makes normal communication impossible. BPL, a Part 15 device as defined in the FCC Regulations, is prohibited from interfering with other services licensed by the FCC. Now that your tests are completed, I ask that you correct the interference immediately or shut down the BPL system per Part 15 of the Regulations.

I started receiving serious levels of interference on March 30 when your BPL equipment was first installed. It has continued 24 hours a day since the 30th except for a few test shut downs. I have confirmed the interfering frequencies with Tom Luecke of Amperion. I've also demonstrated the problem to Alliant employees. Alliant and the Nebraska Center for Excellence in Electronics visited my station on April to record BPL levels. They were able to observe the strong levels of interference and to note that when the BPL was shut down, all of this interference disappeared.

The Amperion representative has provided me with a listing of the amateur frequency bands which he had notched when the system was installed. This includes the 20, 17, 15, 12 and 10 meter bands. However, I'm still receiving significant interference in those amateur bands and additionally in the 30 and 40 meter bands. The notching is ineffective in alleviating the harmful interference that I'm experiencing.

I again offer to demonstrate to any in Alliant management, or other Alliant employees, the extreme interference caused by BPL to my licensed Amateur Radio operation. I've also offered to help run susceptibility tests to determine what impact operation of a licensed Amateur Radio station might have on a customer using BPL for an Internet connection.

Below, in a standardized format prepared by the American Radio Relay League, is a report on the harmful interference I am receiving . I can supply more details on the interference or actual recordings if that would be helpful.

Sincerely,

James L. Spencer

Report of Harmful Interference from a Broadband Over Power Line Trial

Name of complainant: James L. Spencer

Call sign : W0SR

Station location: 3712 Tanager Dr. NE, Cedar Rapids, Iowa 52402

Telephone: 319-393-7353

Email: jlscr2@yahoo.com

Description of Interference: Extremely strong carriers with some modulation occurring throughout the amateur bands, often occurring less than every 2 KHz. The frequencies shift some with time but are generally on the low end of the 10 meter band, throughout the 12, 15, 17 and 40 meter bands. Interference can on the 20 and 30 meter bands seems to change although at times has been extremely strong.

Description of station: Icom IC-765, Icom IC-735, Kenwood TL-922A Power Amplifier (1000 watts), Alpha 76 PA Power Amplifier (1500 watts)

Receiver(s) affected: IC-765, IC-735

Antenna type: 1. TH7DXX rotary beam; 2. Inverted Vee's for 75 and 40 meters; 3. HF-2V Vertical for 80 and 40 meters; 4. rotary dipole for 30, 17 and 12 meters; 5. Inverted L for 160 meters

Antenna location: Tower is located about 80 feet from street in backyard.

Distance of antenna from own house (feet): 4 feet

Distance of antenna from neighboring houses (feet): approximately 30 feet

Distance of antenna from power distribution line or equipment: Antenna is about 50 feet from distribution line, about 500 feet from nearest BPL unit.

Log of interference

I have picked one typical day for this report although I've recorded information for many days. This

interference is on full time as I stated above.

Date : 4-17-04

Time 10:50 to 11:22 AM

The interference consists of carriers spaced approximately every 2 KHz. as noted above.

Frequency: 40 meters (7.0 to 7.3 MHz) Mode: CW/SSB Interfering Signal Strength: S8 to S9

Frequency: 30 meters (10.1 to 10.150 MHz) Mode: CW Interfering Signal Strength: S6 to S8

Frequency: 20 meters (14.0 to 14.350 MHz) Mode: CW/SSB Interfering Signal Strength: S5 to S7

Frequency: 17 meters (18.068 to 18.168 MHz) Mode: CW/SSB Interfering Signal Strength: S9

Frequency: 15 meters (21.0 to 21.450 MHz) Mode: CW/SSB Interfering signal Strength: S8 to S9

Frequency: 12 meters (24.890 to 24.990 MHz) Mode: CW/SSB Interfering Signal Strength: S7 to S9

Frequency: 10 meters (28.0 to 28.4 MHz) Mode: CW/SSB Interfering Signal Strength: S7 to S8

Mr. Tim Van Weelden
Alliant Energy
1001 Shaver Road NE
Cedar Rapids, IA 52402

30 May 2004

Dear Mr. Van Weelden:

I have been an active ham operator for more than 50 years, operating all HF bands plus 2m and 70cm, both fixed station and mobile. My equipment ranges from home-built to Collins KWM-380 to ICOM 706MKIIG, using a variety of antennas. About 2/3 of my operating time is mobile, as I do a lot of driving, and about half of that is on the HF bands.

Most hams I know have a concern about the impact of BPL on their ability to continue operation in the HF bands, myself included. When I heard Alliant was going to test an Amperion system in Cedar Rapids, I decided to drive over and see for myself how bad it was. It was even worse than I had heard! On May 20, around noon, in the vicinity of Glass Road and Amber, I recorded the following BPL interfering signals:

Band	S-Meter	Comments
40m	5-7	Every kHz or so, over the entire band
30m	5-6	Entire band
20M	3-4	Every 10-15 kHz; 14356 was S-5
17m	5-6	Entire band
15m	7-8	From 21,250 on up
12m	5	
10m	2-5	All over low end from 28029+; a few found S-7 to S-8

As I drove away from the area, I was listening on 15m -- the BPL diminished, but never quite into the noise level. Then, 2 blocks away, as I passed another overhead power line, it increased to S-6 on 21263 MHz. I have no doubt the adjacent houses would hear the same or worse. I am told this system has already had one round of "tailoring" to "protect" the amateurs.

The present environment for mobile operation has an appalling number of places where operation is impossible due to man-made interference, but at least I can drive to a different area (except for emergency communications!). Part of the reason I built a new home in the country was to get away from such interference for my fixed station operation.

If this system becomes widespread, no urban area will be free of this HF interference, and as I am an Alliant customer, you have the potential of delivering it right to my door! The Part 15 radiation limits are clearly inadequate, even if enforced. This technology is nothing less than deliberate pollution at the expense of other licensed services. I urge you not to do this!

Sincerely yours,

cc: Federal Communications Commission
Attn: Alan R. Stillwell, Room 7-C210
445 12th St SW
Washington, DC 20024

ARRL RFI Desk
225 Main St.,
Newington, CT 06111.

R L Kittrell

Richard L. Kittrell WØRFX
169 Fairview Road
Springville, Iowa 52336-9227

Amateur Radio W00F
3951 Sally Drive NE
Cedar Rapids IA 52402-2670
Telephone: 319/378-3141
2,475 feet from BPL Test Site
May 11, 2004

Mr. Tim VanWeelden
Alliant Energy
1001 Shaver Road NE
Cedar Rapids IA 52402

Dear Mr. VanWeelden:

Recently your firm began testing the Amperion BPL system. I have three reasons to encourage you to forego this system to get high speed data service to your clients. First, as an investor in electric utilities for 44 years and Alliant or predecessors for seven years, I believe the resources of labor and money could be much better spent improving and keeping up your primary business, namely as an electric power supplier and distributor.

Secondly, as a short wave broadcast listener and thirdly, as a radio amateur specializing in contacts with small and/or overseas stations that have signals of very low magnitude (often 0.08 microvolts), I'm concerned that even a moderate scale installation of BPL repeating equipment will multiply the present interference with my listening and two-way operations. Presently I am being interfered with by BPL signals of some 8 to 12 microvolts from 7241.27 kilohertz to 7307.87 KHz in the 41 meter foreign broadcast band.

My two-way amateur operations are being interfered with by BPL signals of some 2 to 3 microvolts from 21,116.252 KHz to 21,406.161 KHz.

If you should put in more of these Amperion BPL repeaters to carry data down longer 4160 volt lines, the injection voltages will have to be increased to get 100% copy on data to the last repeater or 802.11b "Wi-Fi" 2.4 GHz transmitter, and this will cause more radiation from the lines and more interference. There is a strong possibility these signals will skip for hundred, even thousands of miles. I know this from personal experience that a very low power transmitter on 7, 14 or 21 MHz, having about same field strength at 1/4 mile as your BPL repeater does at 2,475 feet, can have confirmed "hearings" and two-way contacts with every US state and a few overseas countries.

I would like to respectfully suggest you consider fiber optic to your 2.4 GHz transmitters. That should be much more reliable in passing data to the last link before being relayed via 2.4 GHz to clients' homes.

I'm writing this a bit late because until our recent rains, the horrible power line noise buried any noises the BPL repeaters made. This is where your time and money should be spent because equipment that causes noise on short wave frequencies often burns out at a later date when the temperatures are extreme or lightning strikes occur nearby. I was a power line noise locator and carrier current technician for Black Hills Power and Light of Rapid City, South Dakota, before my Naval service, and rather than just complaining, I'm willing to spend time and gasoline in my vehicle or yours to find and identify these noisy loose hardwares in dry weather, cracked insulators, fuse blocks and lightning arrestors and insulators that have a smear of lead or iron from BB's or shot pellets. Then you need to repair, tighten or replace the faulty component rather than following the "if it ain't burned out, don't fix it" philosophy.

I thank you for your consideration in this matter, and am looking forward to hearing modest signals again.

Sincerely,

William D. Snyder

William D. Snyder, W00F

James Burtie

From: James Burtie
Sent: Friday, June 04, 2004 10:17 AM
To: 'timvanweelden@alliantenergy.com'
Subject: Request your FAX number

Mr. VanWeelden,

This is Jim Burtie of the FCC again. I would like you FAX number if you have one in the event that I receive IX complaints on paper. That would enable me to avoid mail delays when forwarding the complaints to you. My number is (202) 418-2445. You may respond with e-mail or on the phone.

Thanks,

Jim Burtie
Chief Experimental Licensing Branch
Office of Engineering and Technology
Federal Communications Commission

Alliant energy
800 255 4268

Left message 5/19/09 - need to know
who to send complaint to.

James Burtie

From: Timothy Van Weelden
Sent: Friday, June 04, 2004 3:00 PM
To: James Burtie
Subject: Re: Request your FAX number
My fax number is 319-786-1959.

Thanks

Jim Van Weelden
Senior Customer Service Manager
319-786-1934

>> "James Burtie" <James.Burtie@fcc.gov> 06/04/04 09:17AM >>>

Mr. VanWeelden,

This is Jim Burtie of the FCC again. I would like your FAX number if you have one in the event that I receive IX complaints on paper. That would enable me to avoid mail delays when forwarding the complaints to you. My number is (202) 418-2445. You may respond with e-mail or on the phone.

Thanks,

Jim Burtie
Chief Experimental Licensing Branch
Office of Engineering and Technology
Federal Communications Commission

*Alliant***Alan Stillwell**

From: Anh Wride
Sent: Wednesday, April 21, 2004 11:15 AM
To: Alan Stillwell; James Burtle; Alan Scrim; William Hurst; Bruce Franca
Subject: FW: Question

info on the labeling status of the BPL equipment in the NC trial, alleged to have no labeling.

-----Original Message-----

From: Gerrett Durling [mailto:gdurling@amperion.com]
Sent: Wed 4/21/2004 11:08 AM
To: Anh Wride
Cc: Steve Greene
Subject: RE: Question

Hello Anh, Regarding your question below, our products are marked as required. These labels are not visible after installation in underground installations as a user supplied outer enclosure is employed. They are visible on overhead installations but will not be legible over 30 feet in the air. Let me know if you have further questions.

Best Regards,
Gerrett Durling
Principal Regulatory Engineer
Amperion Inc.
978-824-2026
978-659-0080 (fax)

-----Original Message-----

From: Anh Wride [mailto:Anh.Wride@fcc.gov]
Sent: Mon 4/19/2004 10:32 AM
To: Steve Greene
Cc:
Subject: Question

Hi Steve:

Could you let me know if your equipment as part of the Progress Energy experimental deployment in North Carolina is properly labeled according to 47 CFR 2.954 and 15.19? Thanks!

Anh Wride
Senior Engineer
FCC OET/PRD

4/26/2004

William Snyder

3951 Sally Drive NE
Cedar Rapids IA 52402-2670
(319)378-3141
May 11, 2004

Federal Communications Commission
James R. Burtle
Chief, Experimental Licensing Branch
Room 7-A267
445 12th Street SW
Washington DC 20024

Dear Mr. Burtle:

I wish to register a complaint about two types of interference caused by equipment under the control of Alliant Energy of Cedar Rapids, Iowa. I have also informed Mr. Tim VanWeelden of Alliant Energy at 1001 Shaver Road NE, Cedar Rapids IA 52402.

- 1A. BPL Signals spaced about every 1111 Hertz from 7241.27 to 7307.87 KHz interfering with my communicating with low power amateur stations and hearing certain foreign broadcast stations well. These signals are from 8 to 12 microvolts in strength whereas the desired stations are from 1 to 10 microvolts (at 50 ohms impedance).
- 1B. BPL Signals also spaced about 1111 Hertz apart from 21,116.252 KHz to 21,406.161 KHz of strength 2 to 3 microvolts interfering with amateur stations from 0.08 to 2 microvolts. The BPL Signals originate from Amperion type repeaters on a 4160 volt line 2,475 feet from my station. I'm sure that if my antenna were horizontally polarized, these BPL signals would be much stronger.
2. One hundred-twenty cycle hums, buzzes and sometimes arcing sounds from loose hardware and faulty insulators and other problems types unknown that vary with the weather. The noise is always bad on 3.5 MHz and generally bad (over 15 microvolts) on 7, 10 and 14 MHz amateur bands.

The noise is at its worst along the 34.5 KV transmission lines from near Alliant Energy's maintenance and warehouse area on Shaver Road NE to the water purification plant also on Shaver Road NE, up the hill into the residential areas on Wenig Road NE to Glass Road and north, branching to cross Tanager Drive and on to a western part of Glass Road to Blue Jay Drive. Some noise is carried some two miles from the light industrial area and others originate on the 34.5 KV line some 150 feet east of Wenig Road NE and north of Glass Road which is residential. These closer lines are some 1,650 to 2,475 feet from my station.

Many days the noise is severe enough on my Delco car radio to nearly wipe out KXEL, a 50KW AM station on 1540 KHz 35 miles away at Dysart, Iowa, (studio at Waterloo), WHO, a 50KW AM clear channel station on 1040 KHz near Des Moines, Iowa, 105 miles distant and WSUI, the University of Iowa AM station 5KW on 910 KHz, 27 miles distant. This interference is at its worst along Wenig Road, some three miles of it, and one of my most used routes to downtown Cedar Rapids.

I am late in reporting the BPL interference because the line noise masked over it until our rains the last few days.

Unofficially, it seems as if Alliant doesn't want to devote resources to fixing faulty line equipment until something burns out from a voltage surge or extreme temperatures.

I believe I qualify as an experienced observer of these problems since I have been a shortwave broadcast listener for 65 years and into amateur radio since 1948; former holder of FCC 1st Class Radiotelephone operators license, and former Navy electronics technician 1st Class. I had been a carrier current technician and interference locator for Black Hills Power and Light Company of Rapid City, South Dakota. I have just offered in writing to donate time and vehicle fuel to help Alliant Energy find these noise sources, though I did so verbally some years ago.

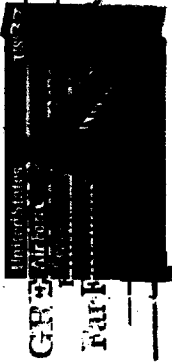
I have lived here ten years now and the noise keeps increasing. Even after a few days of rain that swells the fibers in the wooden poles and tightens the fitting of the hardware which lessens some minor arcs, other noises appear that were covered up. My receiver is first class: a Yaesu 1000D with extra filters; my antenna is average, a Hustler 5BTV ground mounted vertical with 23 buried radials and in good condition. These interfering noises have all been confirmed with a battery operated receiver, some 200 feet from any house wiring or appliances.

I thank you for your consideration in this matter, and am looking forward to hearing modest signals again.

Sincerely,

William D. Snyder, W0OF

WILLIAM D SNYDER
3951 SALLY DR NE
CEDAR RAPIDS IA 52402-2670



RECEIVED & INSPECTED
MAY 24 2004
FCC-MAILROOM

FEDERAL COMMUNICATIONS COMMISSION
JAMES R BURKLE
CHIEF, EXPERIMENTAL LICENSING BRANCH
ROOM 7-A267
445 12TH ST SW
WASHINGTON DC 20024

2002472101

✓

**CEDAR RAPIDS, IOWA, BPL Trial System Radio Frequency
Interference Tests**

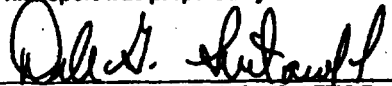
Sponsored by:

Cedar Rapids BPL Steering Committee
June 18, 2004

The Cedar Rapids, Iowa, BPL Steering Committee ("BPLSC") sponsored a series of tests to demonstrate the degree of radio frequency interference ("RFI") occurring to a licensed Amateur Radio station located near the BPL trial site of Alliant Energy.



For the Cedar Rapids BPL Steering Committee:

This report was prepared by:

✓  6/18/2004

Dale G. Svetenoff, WASENA, Certified EMC Engineer, NARTE Certification #EMC-001549-NE

Reviewed by:

	<p>I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.</p> <p> 6/18/2004</p> <p>Robert W. Walstrom</p> <p>My license renewal date is December 31, 2005.</p> <p>Pages or sheets covered by this seal:</p> <p>1-18, 23-32</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
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✓ CEDAR RAPIDS, IOWA, BPL Trial System Radio Frequency Interference Tests

Sponsored by:

✓ Cedar Rapids BPL Steering Committee
June 18, 2004

1. EXECUTIVE SUMMARY

A series of tests were conducted during April and May, 2004, in the northeast quadrant of Cedar Rapids, Iowa, to demonstrate the extent to which Broadband over Power Line ("BPL") signals (from a trial system) interfere with Amateur Radio communications in the medium frequency ("MF") and high frequency ("HF") electromagnetic spectrum. The data was collected using the normal, installed antennas of a typical Amateur Radio station.

These tests show that BPL signal levels from a system located nearly 200 meters from the Amateur Radio station are more than strong enough to severely interfere with normal communications in the 1.8 to 30 MHz frequency range. Signal level comparisons are shown for critical spectrum areas both with and without the BPL signals being present. The antennas and radio equipment used in the affected station are neither special nor uncommon; the equipment has the requisite sensitivity for effective MF and HF communications. The spectrum analyzer used to collect the data had performance characteristics slightly less sensitive to those of the radio station's transceiver (combination transmitter and receiver unit – only the receive characteristics are considered in this report).

2. INTRODUCTION

The Cedar Rapids, IA, BPL Steering Committee ("BPLSC") sponsored a series of tests to demonstrate the degree of radio frequency interference ("RFI") occurring to a licensed Amateur Radio station located near, but not directly adjacent to, the BPL trial site of Alliant Energy.

Tests by Metavox and NTIA have been conducted to show either compliance of BPL systems to applicable FCC Part 15 limits or to model or demonstrate the area over which interference from typical BPL trial system emissions¹ occurs or may occur.

¹ Examples include: "BPL Trial Systems Electromagnetic Emissions Tests", Metavox, Inc., March 20, 2004. Submitted by American Radio Relay League as Exhibit A in NPRM filing to Docket 04-37; "Potential Interference from Broadband Over Power Line (BPL) Systems to Federal Government Radio Communications at 1.7 to 80 MHz – Phase 1 Study, Volumes 1 and 2", U.S. Department of Commerce, NTIA Report 04-413, April 27, 2004.

While Part 15 contains measurement standards and electromagnetic limits (which are not addressed by this report), it is the intent of this report to assess compliance with Part 15 in its entirety. The Amateur Radio Service is an FCC - licensed service under Part 97 of the FCC regulations. The BPL system currently being tested by Alliant Energy is regulated by Part 15 of the same FCC regulations. Part 15 of the FCC regulations clearly stipulate that, "Parties responsible for equipment compliance should note that the limits specified in this part will not prevent harmful interference under all circumstances." (§15.15 General technical requirements. (c)) and that, "Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused..." (§ 15.5 General conditions of operation. (b)).

The subject tests of this paper were performed using the actual installed antennas of the Amateur Radio station. This test approach correctly characterizes the harmful interference that is afflicting this Amateur Radio station.

This effort consisted of measuring the *effect* on MF and HF communication systems from the radiated emissions of overhead power line systems carrying trial Broadband over Power Line ("BPL") service. The subject system was frequently idling and not carrying continuous data at the time of the tests². Although power companies have transmitted status and control signals over their power lines for many years using the VLF spectrum (and not producing any significant interference to other services), BPL is a recent expansion of that concept in which broadband data is sent using the MF and HF spectrum. BPL systems use digital signal communications of wide bandwidth. Tests were conducted by Alliant Energy² using a trial BPL system deployed to test BPL concepts and hardware. The trial system hardware is supplied by Amperion, and it is located in the northeast quadrant of Cedar Rapids, IA. The system under study occupied spectrum in the frequency region from approximately 1.7 MHz (just above the AM broadcast band) to 30 MHz at the time of the tests.

The purpose of the tests conducted is to measure the signal level, due to BPL radiated emissions, as they appear at the operating position of an active Amateur Radio station. All signals measured, regardless of source, were as intercepted by the various antennas of the licensed Amateur Radio station. The antennas are for use in the Amateur Service MF and HF bands, and are typical of types in general use. It is important to note that these are not measurement antennas, but *communication* antennas.

The testing conducted was designed to determine the extent to which *normal, generally used, communication antennas* are capable of delivering signals that cause severe interference to routine Amateur Radio Service MF and HF communications. It was noted that Alliant Energy conducted on-site emissions measurement tests during the time period the data for this report was taken. (This data has not been made available to the BPLSC by date of this report.) It is presumed that the subject trial BPL system was operating within current allowable FCC Part 15 limits at the time of our tests. At the request of the

² Private communication between Mr. James Spencer, WØSR, and representatives of Alliant Energy.

BPLSC representative, Mr. James Spencer, Alliant Energy twice commanded the BPL system to shut down for a two (2) hour period in order that baseline "no BPL signal" measurements could be made.

The tests were performed during April and May, 2004, with specific dates given in the data presentations. The subject BPL trial system was activated on or about March 30, 2004, along a portion of Glass Road, in the northeast quadrant of Cedar Rapids Iowa. The tests were conducted at the residence of Mr. James Spencer, W0SR, located at 3712 Tanager Drive NE, Cedar Rapids, IA, 52402. Mr. Spencer's radio operations room is located on the lower level of his home. This location would tend to minimize the coupling of external fields directly into the radio equipment. The test equipment was set up in the radio operations room, and all measurements were made using the same coaxial cable that normally connects to Mr. Spencer's main MF and HF transceiver.

The results of the BPLSC tests are tabulated in Appendix 1, Part A: Test Data Plots, and a description of the testing and test site is provided in the following sections.

3. THE TEST SITE

The Alliant Energy trial BPL system includes a segment of overhead medium voltage distribution lines, as well as a short segment of buried medium voltage distribution lines. This BPL system is configured to interface with subscribers via Wi-Fi (antenna located on each test unit), and the system runs along Glass Road. Figure 3-1 is a map which shows the geographic relationship between the BPL trial system along Glass Road and Mr. Spencer's residence. The map shows the location of the BPL trial system hardware as it existed at the time of testing, and it helps to understand the location of Mr. Spencer's residence and antenna system relative to both the actual BPL trial lines and other neighborhood power distribution lines that connect to the BPL trial lines, but which are not intentional data carriers at this time.

Note that the Spencer residence is not located directly adjacent to any lines carrying the BPL test signals. Mr. Spencer's antennas are approximately 183 meters (600 feet) from the Glass Road lines. They are approximately 30.5 meters (100 feet) from the distribution line which runs just northwest of the property.

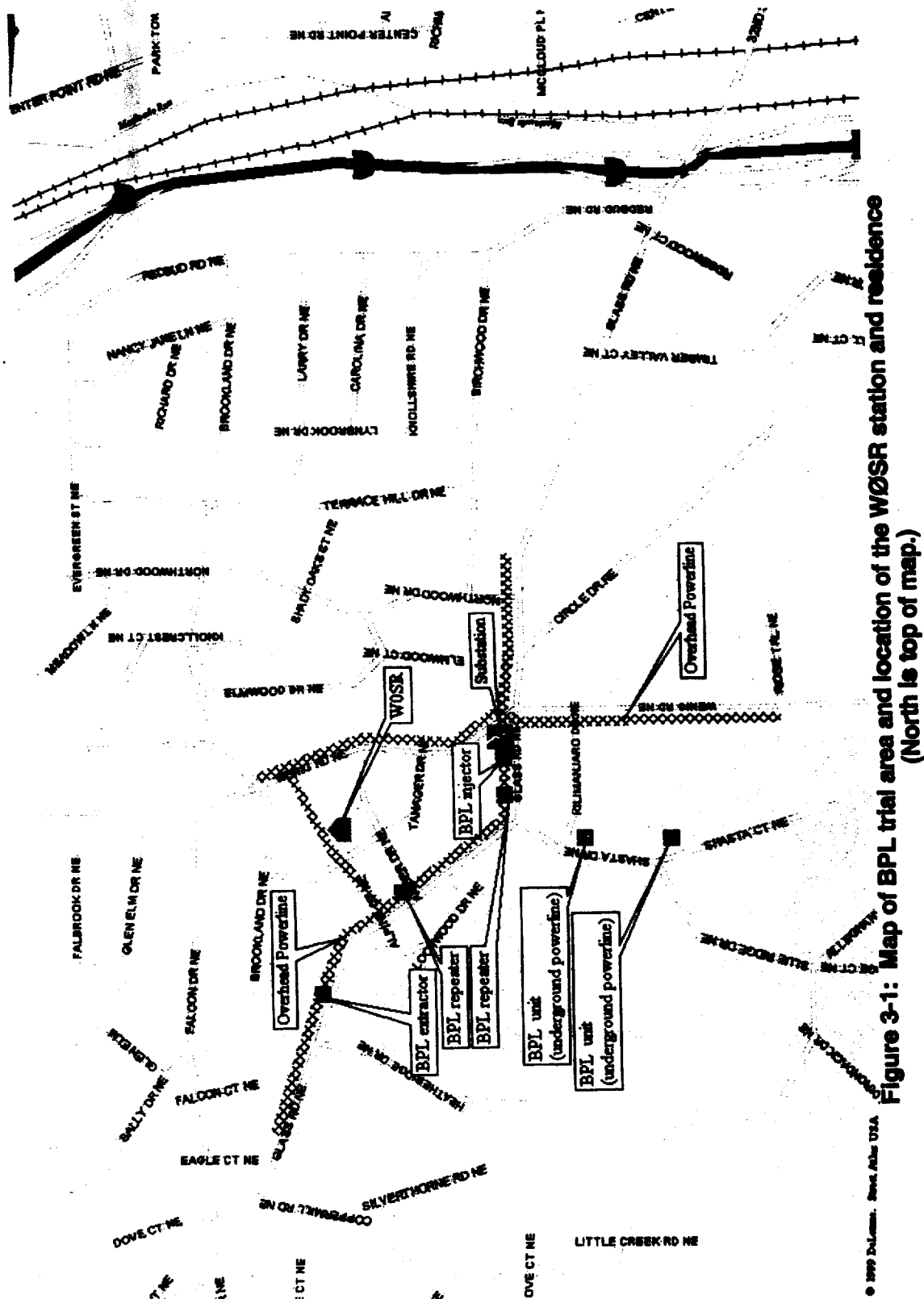


Figure 3-1: Map of BPL trial area and location of the W0SR station and residence (North is top of map.)

The actual BPL hardware nearest to Mr. Spencer's Amateur Radio station is at the intersection of Glass Road and Amber Drive, shown below. (The BPL repeater is the gray box located on the right hand side of the power pole, near the top.)



Figure 3-2: BPL Repeater at Intersection of Glass Road and Amber Drive

This location is southwest of the Spencer residence. Figure 3-3 is a view taken from Mr. Spencer's property looking toward the northeast. The roadway extending across the picture, in the foreground, is Tanager Drive, which runs approximately northwest-southeast in this area and is generally parallel to Glass Road. The intersecting roadway is Amber Drive. The power lines carrying the BPL signals along Glass Road are visible in the background.

Figure 3-4 is a view of Mr. Spencer's residence looking toward it from the direction of the Amber Drive-Tanager Drive intersection. Not clearly visible, but present in the background of this photo, are another set of overhead power lines which run approximately east-west (shown in Figure 3-1 map in blue) and appear to be a branch-off from the Glass Road lines. (A small portion of the branch power line is visible in the area just above the house roof.)



Figure 3-3: Intersection of Amber Drive and Tanager Drive, as viewed from the Spencer residence



Figure 3-4: View of the Spencer residence showing front of the house and the back yard antenna tower. Other neighborhood distribution lines are visible above the house roof, in the open sky area.